REMARKS

Reconsideration and allowance of this application are respectfully requested. New claims 9-13 have been added. Claims 1-13 are now pending in the application, of which claims 3 and 8 have been withdrawn from consideration. The rejections are respectfully submitted to be obviated in view of the remarks presented herein.

Rejection Under 35 U.S.C. § 102(b) - Konishi et al.

Claims 1, 2, 4 and 5 have been rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Konishi et al. (U.S. Patent No. 6,012,858; hereinafter "Konishi"). The rejection is respectfully traversed.

In independent claim 1, a spin coating apparatus for coating photoresist comprises a spin chuck, which comprises "a mount part, for mounting a wafer thereon, and an extended projection part for facilitating formation of an edge-bead thereon." The spin coating apparatus also comprises "a nozzle for depositing photoresist onto a wafer mounted on the mount part of the spin chuck."

In rejecting claim 1, the Examiner alleges that Konishi discloses a spin coating apparatus comprising a spin chuck, which comprises a mount part (2) and an extended projection part (30). The Examiner also maintains that Konishi discloses a nozzle (40).

Konishi discloses a spray coating apparatus for forming a uniform thin film on the surface of a substrate. The developing unit (DEV) in Konishi forms a liquid film on a wafer (W) by spraying a development solution (10) from a scan-moved supply nozzle (40) (col. 8, lines 8-

10). When the wafer (W) is placed in the tray section (30) and spray coated with the developing solution (10), the spin chuck (2) is disconnected from the wafer (W) (col. 7, lines 50-59). The tray section (30) contains a peripheral holding portion (31), a liquid-receiving base (32), and an embankment (33) (col. 5, lines 59-62). As shown in Fig. 6, the tray section (30) is held in place by the hollow member (50) via the supporting mallets (51) (col. 5, lines 57-59), and is not physically connected to the spin chuck (2). In depositing the developing solution, the supply nozzle (40) moves at a constant speed across tray section (30), and sprays the developing solution (10) onto the entire surface of the liquid-receiving base (32) and the wafer (W), both of which remain stationary (col. 8, lines 1-19; Figs. 14A-B). After the development process is performed, the tray section (30) is removed, and the spin chuck (2) mounts and rotates the wafer (W) during the washing process (col. 8, lines 30-38).

The disclosure of Konishi does not anticipate the claimed invention. Konishi does not teach or suggest "a spin chuck comprising a mount part, for mounting a wafer thereon, and an extended projection part for facilitating formation of an edge-bead thereon," as recited in claim 1. Instead, the spin chuck (2) of Konishi is completely separate from the tray section (30), and is used at a different stage of the development process, namely the washing process and not the coating process. Also, Konishi rotates the wafer (W) only during the washing process, and no rotation occurs during the coating process. Therefore, in contrast with the claimed invention, which recites that the invention relates to a *spin* coating apparatus, Konishi discloses only a *spray* coating apparatus. In addition, because Konishi does not spin the wafer (W) during the coating process, it cannot form an edge-bead of the developing solution (10) on the tray section

(30) or facilitate the formation of such an edge-bead, as set forth in claim 1. In fact, Konishi emphasizes that a uniform film is formed on the wafer (W) (col. 3, lines 6-17), further teaching away from facilitating the formation of an edge-bead on the tray section (30).

Also, Konishi deposits the *developing solution* (10) onto a wafer (W) *that has already been coated with a photoresist by some unknown process* (col. 1, lines 8-12). Therefore, Konishi fails to teach or suggest the deposition of *photoresist* on a wafer, as set forth in claim 1. Although photoresist may be a form of liquid film, Konishi's liquid film is disclosed specifically to be a development solution, and is formed on top of a substrate surface already coated with a photoresist. At least by virtue of the aforementioned differences, Applicants' claim 1 distinguishes over Konishi. Claims 2, 4, and 5 are dependent claims including all of the elements of independent claim 1, which, as established above, distinguishes over Konishi. Therefore, claims 2, 4 and 5 are patentable over Konishi for at least the aforementioned reasons as well as for their additionally recited features. Reconsideration and withdrawal of the rejection under 35 U.S.C. § 102(b) are respectfully requested.

With further regard to claim 2, the height of the extended projection part is recited to be lower than that of the mounted wafer. In rejecting claim 2, the Examiner maintains that Fig. 14C shows that the extended projection part (30) may be placed at a height lower than that of the wafer. However, Fig. 14C illustrates the washing process of Konishi, not the coating process of the present invention. Konishi does not teach positioning the liquid-receiving base (32) at a height lower than the wafer (W). On the contrary, Konishi requires that the upper surfaces of the wafer (W) and the liquid-receiving base (32) have the *same* height (col. 6, lines 4-7). In Konishi,

the developing solution (10) is formed on the surface of the liquid-receiving base (32), not the peripheral holding portion (31), which is the only part of the tray section (30) that is below the wafer (W). Therefore, at least by virtue of these additional differences, as well as for the aforementioned reasons, Applicants' claimed invention distinguishes over Konishi.

With further regard to claim 4, "the extended projection part of the spin chuck surrounds a circumference of the wafer while being in contact with the circumference of the wafer mounted on the mount part." In rejecting claim 4, the Examiner maintains that this element is shown in Fig. 17; col. 5, line 57 - col. 6, line 23. However, as discussed above, when the wafer (W) is placed in the tray section (30) for coating, the spin chuck is removed (col. 7, lines 50-59). *This necessitates that the wafer (W) of Konishi is not mounted on the mount part of the spin chuck (2) while the extended projection part surrounds a circumference of the wafer*. Also, Konishi discloses that there is a slit between the edges of the liquid-receiving base (32) and the wafer (W) (col. 8, lines 21-23; Fig. 6). Even if the entire tray section (30) is read as "the extended projection part," the liquid-receiving base (32) surrounds a circumference of wafer (W) while the peripheral holding portion (31) is in contact with the circumference of the wafer (W), and Konishi would still fail to teach or suggest the element of the extended projection part being in contact with the circumference of the wafer ***mounted on the mount part***, as claimed. Therefore, at least by virtue of these additional differences, as well as for the aforementioned reasons, Applicants' claimed invention distinguishes over Konishi.

With further regard to claim 5, "the spin chuck further comprises a separation part for separating the wafer from the spin chuck." In rejecting claim 5, the Examiner maintains that an

arm (col. 5, lines 23-38) allows for separating the wafer from the spin chuck. However, Konishi's wafer (W) is mounted on the spin chuck (2) by a vacuum (col. 5, lines 44-48), and the spin chuck (2) descends after transferring the wafer (W) to the tray section (30) (col. 7, lines 57-59). The wafer (W) thus separates from the spin chuck (2) by release of the vacuum hold. Also, the arm referred to by the Examiner is used to transfer the wafer (W) among various sections of the wafer process system, not to remove the wafer (W) from the spin chuck (2) (col. 5, lines 34-37). Therefore, Konishi does not teach or suggest that the spin chuck (2) comprises a separation part for separating the wafer (W) from the spin chuck (2). At least by virtue of these additional differences, as well as for the aforementioned reasons, Applicants' claimed invention distinguishes over Konishi.

Rejection Under 35 U.S.C. § 102(e) - Yamamoto et al.

Claims 1, 2 and 5-7 have been rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by Yamamoto et al. (U.S. Patent No. 6,709,174; "Yamamoto"). The rejection is respectfully traversed.

As discussed above, independent claim 1 recites a spin coating apparatus for coating photoresist, comprising a spin chuck, which comprises "a mount part, for mounting a wafer thereon, and an extended projection part for facilitating formation of an edge-bead thereon." The spin coating apparatus also comprises "a nozzle for depositing photoresist onto a wafer mounted on the mount part of the spin chuck."

In rejecting claim 1, the Examiner alleges that Yamamoto discloses a spin coating apparatus comprising a spin chuck, which further comprises a mount part (2) and an extended projection part (37). The Examiner also maintains that Yamamoto discloses a nozzle (53).

Yamamoto discloses the spraying of a developing solution on the surface of a substrate. The developing apparatus in Yamamoto comprises a spin chuck (2) that mounts a wafer (W) (col. 4, lines 58-62), a solution-receiving plate (37), and a supply nozzle (51) (col. 5, lines 13-20 and 35-36). In the development process, the supply nozzle (51) is moved at a constant speed from the rear to the front of the wafer (W) while discharging the developer solution (D) (col. 6, lines 25-30). This forms a liquid film on the entire surface of the solution-receiving plate (37) and the wafer (W), which are both held stationary (col. 6, lines 30-34; Fig. 4A). The developer solution (D) is discharged from the solution-receiving plate (37) by flowing downward through the solution-passing holes (38) (col. 6, lines 35-38; Fig. 4B). After stationary development, the rinsing solution (R) is used to remove the developer (D) from the surface of the wafer (W), and the spin chuck (2) rotates the wafer (W) to help remove the developer (D) and spin-dry the wafer (W) (col. 6, lines 50-58; Figs. 4D-E).

The disclosure of Yamamoto does not anticipate the claimed invention. Yamamoto does not teach or suggest "a spin chuck comprising a mount part, for mounting a wafer thereon, and an extended projection part for facilitating formation of an edge-bead thereon," as recited in claim 1. Instead, the spin chuck (2) of Yamamoto is physically separate from the solution-receiving plate (37) (Fig. 1). Also, Yamamoto rotates the wafer (W) only during the rinsing and drying processes, not during the coating process. Therefore, in contrast with the claimed

invention, which recites that the invention relates to a *spin* coating apparatus, Yamamoto discloses a *spray* coating apparatus. In addition, because Yamamoto does not spin the wafer (W) during the coating process, it cannot form an edge-bead of the developer solution (D) on the solution-receiving plate (37) or facilitate the formation of such an edge-bead, as set forth in claim 1. In fact, Yamamoto eliminates flows and waves on the surface of the wafer (W) (col. 3, lines 33-39), further teaching away from facilitating the formation of an edge-bead on the solution-receiving plate (37).

Also, Yamamoto deposits the *developer solution* (D) onto a wafer (W) *that has already been coated with a photoresist by some unknown process* (col. 2, lines 30-32). Therefore, Yamamoto fails to teach or suggest the deposition of *photoresist* on a wafer, as set forth in claim 1. Although photoresist may be a form of liquid film, Yamamoto's liquid film is disclosed specifically to be a development solution, and is formed on top of a substrate surface already coated with a photoresist. At least by virtue of the aforementioned differences, Applicants' claim 1 distinguishes over Yamamoto. Claims 2, 5, and 6 are dependent claims including all of the elements of independent claim 1, which, as established above, distinguishes over Yamamoto. Therefore, claims 2, 5 and 6 are patentable over Yamamoto for at least the aforementioned reasons as well as for their additionally recited features. Reconsideration and withdrawal of the rejection under 35 U.S.C. § 102(e) are respectfully requested.

With further regard to claim 2, as discussed above, the height of the extended projection part is lower than that of the mounted wafer. In rejecting claim 2, the Examiner maintains that the extended projection part (37) of Yamamoto may be placed at a height lower than that of the

wafer. Yamamoto discloses that the solution-receiving plate (37) is preferably positioned at a slightly lower height than wafer (W) (col. 6, lines 9-18). However, as discussed above, the solution-receiving plate (37) is separate from the spin chuck (2), which is in contrast with what is recited in claim 2. Therefore, at least by virtue of these additional differences, as well as for the aforementioned reasons, Applicants' claimed invention distinguishes over Yamamoto.

With further regard to claim 5, as discussed above, "the spin chuck further comprises a separation part for separating the wafer from the spin chuck." In rejecting claim 5, the Examiner maintains that an arm (col. 6, lines 1-6) is a separation part that allows for separating the wafer from the spin chuck. However, Yamamoto's wafer (W) is mounted on the spin chuck (2) by a vacuum (col. 4, lines 58-61). The wafer (W) thus separates from the spin chuck (2) by release of the vacuum hold. Also, the arm in Yamamoto is not part of the spin chuck (2), as set forth in claim 5. Therefore, Yamamoto does not teach or suggest that the spin chuck (2) comprises a separation part for separating the wafer (W) from the spin chuck (2). At least by virtue of these additional differences, as well as for the aforementioned reasons, Applicants' claimed invention distinguishes over Yamamoto.

With further regard to claim 6, the spin coating apparatus further comprises "a gas exhaust part disposed so that gas is exhausted from an edge of the wafer in a turning direction of the wafer and a centrifugal direction upon rotation of the wafer." Yamamoto discloses an airflow generating means (8) that provides an airflow passing over the surface of the wafer (W) from the rear to the front of the wafer (W) (col. 8, lines 24-28). In order to avoid flow and waves in the developer solution (D) on the surface of the wafer (W), the direction of airflow is in the

direction of motion of the supply nozzle (51) (col. 8, lines 44-60). However, Yamamoto fails to teach or suggest a gas exhaust part that exhausts gas in the "turning direction of the wafer and a centrifugal direction upon rotation of the wafer," as claimed. Although a small number of the air discharge holes (83) are oriented to provide airflow in a direction that the wafer (W) may be turnable (Fig. 10B), the wafer (W) does not rotate during application of the developer solution (D). Also, none of the air discharge holes (83) is positioned or oriented to provide airflow in a centrifugal direction from the edge of the wafer (W) (Figs. 10A-B). Therefore, at least by virtue of these additional differences, as well as for the aforementioned reasons, Applicants' claimed invention distinguishes over Yamamoto.

Independent claim 7 recites a spin coating apparatus for coating photoresist that comprises "a spin chuck for rotating a wafer; a nozzle part for depositing photoresist onto the wafer mounted on the spin chuck; and a gas exhaust part disposed so that gas is exhausted from an edge of the wafer in a turning direction of the wafer and a centrifugal direction upon rotation of the wafer."

In rejecting claim 7, the Examiner maintains that Yamamoto discloses a spin coating apparatus comprising a spin chuck, a nozzle (53), and a gas exhaust part (Figs. 10A-B; col. 8, lines 24-67).

As discussed above, Yamamoto discloses an airflow generating means (8) that provides an airflow passing over the surface of the wafer (W) from the rear to the front of the wafer (W) (col. 8, lines 24-28). The airflow generating means (8) includes air discharge tubes (82) that can move up and down (col. 8, lines 31-33). In order to avoid flow and waves in the developer

solution (D) on the surface of the wafer (W), the direction of airflow is in the direction of motion of the supply nozzle (51) (col. 8, lines 44-60).

The disclosure of Yamamoto does not anticipate the claimed invention. As discussed above, Yamamoto does not teach or suggest a *spin* coating apparatus for coating *photoresist*. In addition, Yamamoto fails to teach or suggest a gas exhaust part that exhausts gas in the "turning direction of the wafer and a centrifugal direction upon rotation of the wafer," as recited in claim 7. Although a small number of the air discharge holes (83) may be oriented to provide airflow in a direction that the wafer (W) may be turnable (Fig. 10B), the wafer (W) does not rotate during application of the developer solution (D). Also, none of the air discharge holes (83) is positioned or oriented to provide airflow in a centrifugal direction from the edge of the wafer (W) (Figs. 10A-B). At least by virtue of the aforementioned differences, Applicants' claim 7 distinguishes over Yamamoto. Reconsideration and withdrawal of the rejection under 35 U.S.C. § 102(e) are respectfully requested.

Newly Added Claims

Applicants have added new claims 9-13 to provide more varied protection for the present invention. Support for these claims is found in the specification in at least paragraphs [35], [37], [40], and [48] and Figs. 3-5. That is, the cited references do not teach or suggest: a spin coating apparatus "wherein the extended projection part of the spin chuck is physically attached to the mount part of the spin chuck," as recited by claim 9; a spin coating apparatus "wherein the entire circumference edge of the wafer is in contact with the extended projection part of the spin chuck," as recited by claim 10; a spin coating apparatus "wherein the separation part comprises

removable plugs that are inserted through corresponding holes in the spin chuck to push against the bottom of the wafer and separate the wafer from the spin chuck," as recited by claim 11; or a spin coating apparatus "wherein the gas exhaust part is disposed above the wafer, and the gas is exhausted to remove an edge-bead," as recited by claims 12 and 13.

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

Lenny R. Jiang
Registration No. 52,432

SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

WASHINGTON OFFICE
23373
CUSTOMER NUMBER

Date: August 12, 2005